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(54) **IMPROVEMENTS ON ELECTRIC CLOCKS**

(54) **PERFECTIONNEMENTS AUX HORLOGES ELECTRIQUES**

Specification

To all whom it may concern Be it known that I Jakob Scheidegger of Soleure in the Canton of Soleure Swiss Confederation Clock maker, have invented new and useful "Improvements on electric clocks" and I do hereby declare that the following is a full clear and exact description of the construction and operation of the same.

This invention relates to an electric clock and in order that it may be more readily understood I have illustrated it in the accompanying Drawings and will describe it with reference thereto and to the letters and figures marked thereon.

In this clock the barrel is dispensed with

and two wheels are employed of which the one A (Figure 1) is fixed on the arbor of the minute hand and drives the motion work B which moves the hour hand. The other wheel C drives the pinion c on the escapement wheel arbor. With this arrangement the power is therefore applied directly to the center wheel by means of the mechanism which I will proceed to describe serially in order that the novel parts of this clock may be readily understood.

Upon the center of wheel A is fixed radially a straight spring a rather shorter than the radius of the wheel. It is evident that if pressure be applied to the extremity of this spring so as to bend it in the direction in which the wheel A should turn this wheel will follow the impulse given by the flexure of the spring and actuate the escapement to a corresponding extent.

In order to obtain the constant motive power necessary to keep the clock going regularly it is only necessary that this pressure should be continued without interruption. To this end a ratchet wheel D Figures 1 and 2 having fine teeth runs loose upon the same arbor with wheel A and has a pin b fixed to it at one side near the circumference which presses against spring a near its extremity as shown in Figure 1. The wheel D is rotated by the gravity of a weight P (Figures 2, 3 and 4) fixed on the extremity of a horizontal lever b' pivoted at b' upon which the weight is secured adjustably by means of a set screw d so as to act

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with greater or less leverage according to the amount of power required. Pivoted to this lever F' at c is a pendent arm or pawl G (Figures 2 and 3) which hangs tangentially to the ratchet wheel D and terminates in a rib which is caused to engage with the teeth of the ratchet by a spring S (Figures 2, 3 and 4) pressing upwards against the curved tail end g of this pawl. A uniform motive power is thus obtained so long as the weight P is free to descend and when it has fallen to its lowest point it is raised again by electrical action to renew its operation. During the very short space of time occupied in raising the weight P the ratchet wheel D continues to be turned by the stress of the spring S which is always bent to a certain extent so that the motive power is maintained without interruption.

I will now proceed to describe the means employed for raising the weight P periodically by electric action.

A battery (preferably a Leclanche battery as it does not give off any acid vapours) is placed in the clock case beneath the movement with which it is connected by two wires attached by binding screws to the two terminals $H H$ (Figure 5) one of which is in connection with the coils of the electro magnet I through a device the purpose of which will be explained hereafter.

When the current passes in the coils of the electro magnet I (Figures 2, 3, 4 and 5) its armature K is attracted. This armature is pivoted between the two plates of the clock frame upon a point i (Figure 4) and it carries two ears between which the weighted lever F is pivoted at F' . An adjusting screw L

(Figures 2 and 3) regulates the height of the lever *E* relatively to the ratchet wheel *D*. When the armature *K* is momentarily attracted by the electro magnet the lever *E* is raised the pawl *G* slides over the teeth of the ratchet wheel and then the electric circuit being broken as will be presently explained the armature *K* is liberated and allows the lever *E* to recommence its action on the ratchet wheel *D* the power being meantime maintained without appreciable alteration by the stress of spring *a* as before explained. A spring click *L* upon an arbor mounted on the plates of the frame engages constantly with the ratchet wheel *D* and prevents any retrograde movement during the rise of the pawl *G*.

I will now describe the means of determining with precision the closing and breaking of the electrical circuit.

The circuit through the electro magnet is closed by the contact of a small plate of platinum with which a spring *N* (Figure 1) is tipped with a small stud also of platinum fixed on a small disc *m* in electrical connection with the coils of the magnet and is broken by the cessation of this contact.

The closing and breaking of the circuit is effected by the disc *N* (Figures 1 and 4) carried by a canon or tubular arbor of insulating material upon an arbor *n* (Figure 1) mounted at one end in the front plate and at the other in the cock *o*. Upon this arbor is fixed a lever arm *p* to the end of which

is jointed the end of a connecting rod r whose upper end is slotted at r' and connected to the lever E by a pin r'' playing freely in said slot. Upon the same arbor is also fixed an arm terminating in a curved or segmental ratchet toothed rack r^2 with which a click r^3 at the extremity of one arm of an elbow lever pivoted at r^4 may be caused to engage by the stress of a spring r^4 or may be disengaged therefrom by a screw E' upon the lever E passing on the horizontal arm r^5 of said elbow lever. It will thus be seen that as the lever E is raised it raises the arm p by the connecting rod r and as it falls it abuts upon the arm r^5 of the elbow lever disengages the click r^3 and allows the rack r^2 to fall. A slight alternate circular motion is thus imparted to the arbor n and disc N . The effect of this movement is as follows:-

Figure 4 represents the position of the parts when the parts M m are in contact and the current is established. The disc N carries a stud furnished with an adjustable screw which bears upon a horizontal spring u attached to an insulated support. The disc N is also furnished with a pin t for a purpose to be presently explained. The electro magnet I being excited by the passage of the current the armature K is attracted and the lever E raised. By this movement which may be greater or less according to the strength of the current the rod r is raised by the pin r'' in the slot r' and the disc N slightly rotated in the direction of the arrow in consequence of which the

screw s ceases to press upon the spring u and the pin t meets the spring M and flushes it back beyond the extremity of the spring u which can thereupon return to its normal position and prevent the return of the contact spring M against the disk m until the screw s again bears against the spring u. On the breaking of the circuit the screw E' of lever E having been raised off the arm r⁵ of the elbow lever the click x³ is brought up by the spring x⁴ against the rack r⁵ as shown in Figure 2. The current having been interrupted by the pin t acting on the spring M as described the armature is released and the lever E begins to descend by the gravity of weight W, the connecting rod r lever p, arbor a, rack r² and disk N meanwhile remaining stationary in the position to which they have been brought by the rise of lever E until the screw E' presses upon the arm r⁵ of the elbow lever as the lever E on descending, has no action on the connecting rod r the pin x⁴ merely sliding down the slot x¹. But immediately the screw E' presses on the arm r⁵ as shown in Figure 3 the rack r² is released and falls by its own gravity bringing all the parts connected with it to the position shown in Figures 3 and 4 on which the circuit is again closed whereupon the parts are returned to the positions shown in Figure 2 and 6 and the same action is repeated continually so long as the battery is sufficiently strong to cause the attraction of the armature E. The battery

may in course of time become so weak as to be incapable of producing this effect and were the circuit to remain closed there would be a useless wear of the battery. To prevent this the arrangement before referred to and represented in Figures 2, 3 and 4 is provided.

The contact being established by spring M it is necessary to break the circuit at the other wire. For this purpose the other terminal H is in connection with the coils of the electric magnet 1 through a cross bar H² and a spring h' attached to an insulated support h². This spring has at its free end a small head h³ of insulating material which passes freely through a hole in the cross bar H² and projects slightly above the upper surface thereof (Figures 2, 3 and 4).

When the armature K is no longer attracted by the electric magnet it descends until it meets the insulating head h³ which it presses down and forces the spring h' away from the bar H² thus breaking the circuit and automatically preventing waste of the battery.

Having now described my invention to which I have given the name of Schweizer's electric clock I beg to state that I disclaim all other electric clocks now in use.

What I claim as my invention is as follows:
It consists First - The improved electric clock constructed arranged and operating substantially as herein described and shown in the drawings.

Second - An electric clock driven by a weight acting directly on the centre wheel substantially as specified.

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It consists First - The improved electric clock constructed arranged and operating substantially as herein described and shown in the drawings.

Second - An electric clock driven by a weight acting directly on the centre wheel substantially as specified.

Third. In our device a part moved alternately in opposite directions by a weight and by electric action; a ratchet wheel loose on the center wheel arbor; a pin on the ratchet wheel; a spring fixed on said arbor and a click engaging with the ratchet wheel all combined to operate substantially as shown and described for the purpose specified.

Fourth. The combination of the weighted lever and the armature lever connected together at a variable angle and acting reciprocally the one upon the other to produce an oscillating movement on the one hand by electric action and on the other by a counterweight substantially as shown and described.

Fifth. The mode of regulating the angular distance between the two levers by means of a regulating screw in order to determine the extent of upward movement of the counterweight according to the strength of the current substantially as specified.

Sixth. The mechanism for periodically making and breaking the circuit combined to operate substantially as shown and described.

Seventh. The device shown and described for breaking the circuit when the battery is too weak to raise the counterweight said device being operated by the depression of the armature lever by the counterweight lever substantially as specified.

Paris Press

August 18. 1881

Jakob Schweizer.

Signed in the presence of

Jean Baptiste Rolland

Employer at Court

Paris

Henry Willoughby, British Vice Consul, Paris
This is the specification referred to in the Affidavit of
Jakob Schweizer here annexed sworn before me
this 18th day of August in the year of our
Lord 1881.

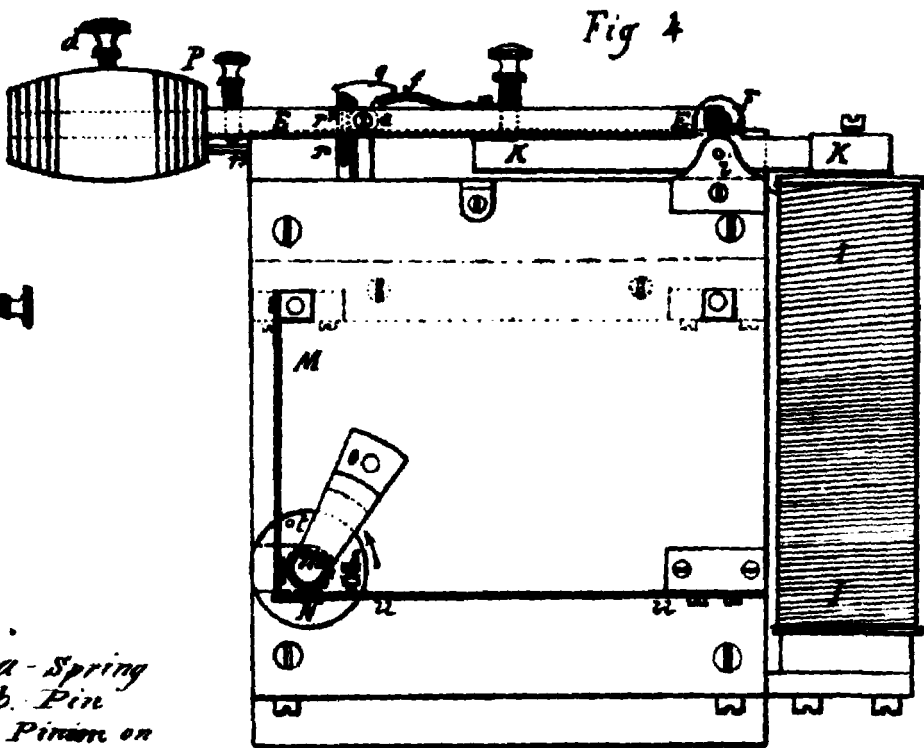


Henry Willoughby

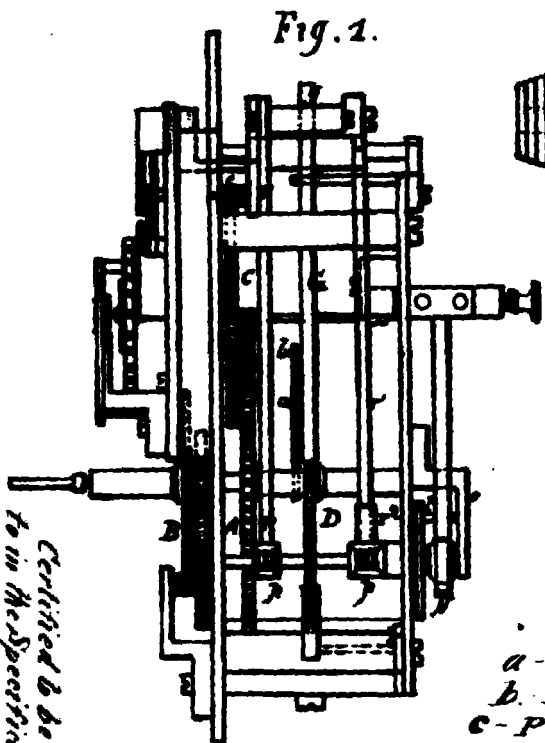
British Vice Consul
Paris

Improvements in Electric Clocks

13414



a - Spring
b - Pin
c - Pinion on
Escapement Arbor



A - Wheel
B - Motion Work
C - Wheel
D - Ratchet Wheel
P - Weight
E - Lever

E' - Screw
F - Pivot
G - Arm or Pawl
I - Electro Magnet
K - Armature
i - Pivot

M - Spring
m - Disk
n - Arbor
s - Adjustable Screw
t - Pin
u - Horizontal Spring

Certified to be the Drawing with
to in the Specification hereinbefore

Witnesses:

Edgar A. Hite

Howard M. Woodbridge

Witnesses

Inventor

By J. H. Beach

Improvements on Electric Clocks

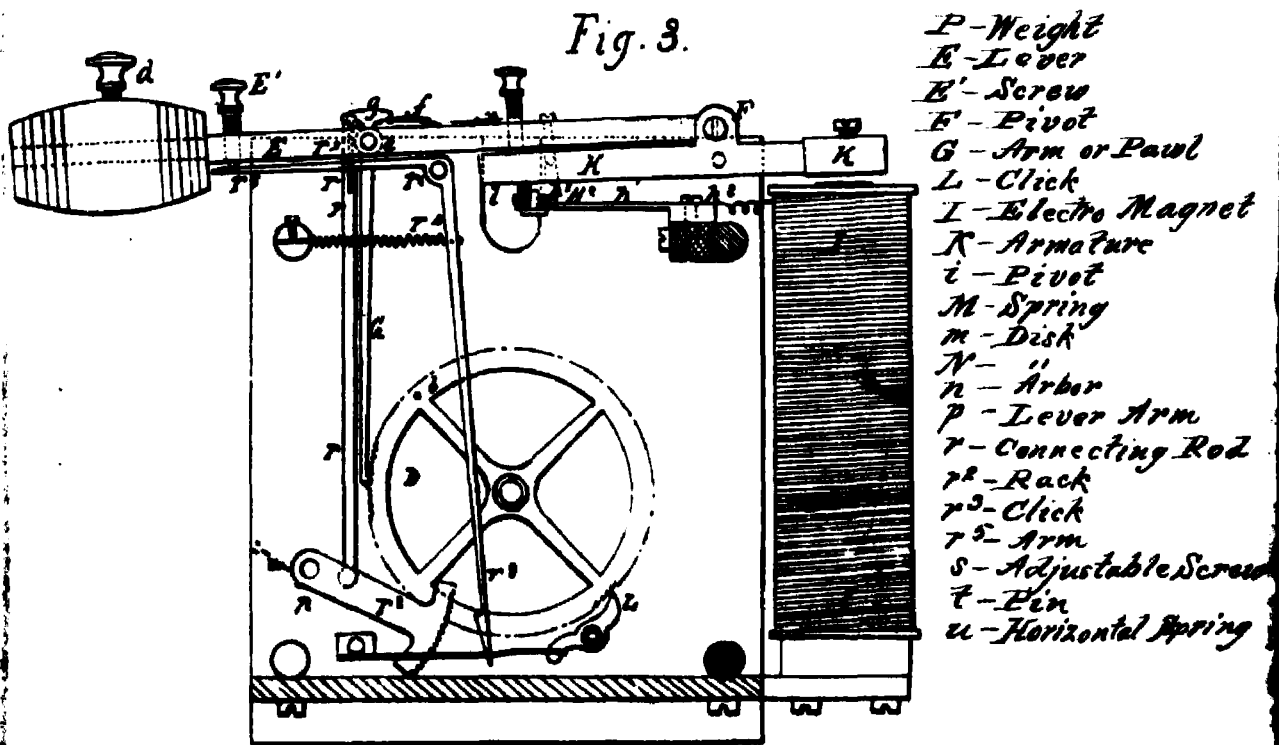
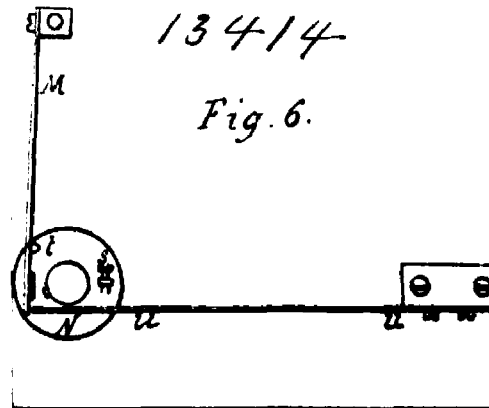
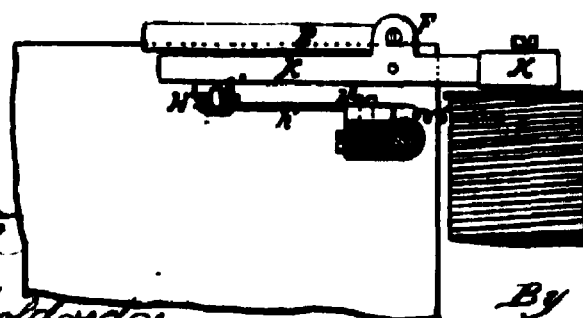


Fig. 7.



Certified to be the Drawing referred to in the Specification herunto annexed

Witnesses:

Edgar Tate

David M. Holdredge

Dated New York, Sept. 5, 1881.

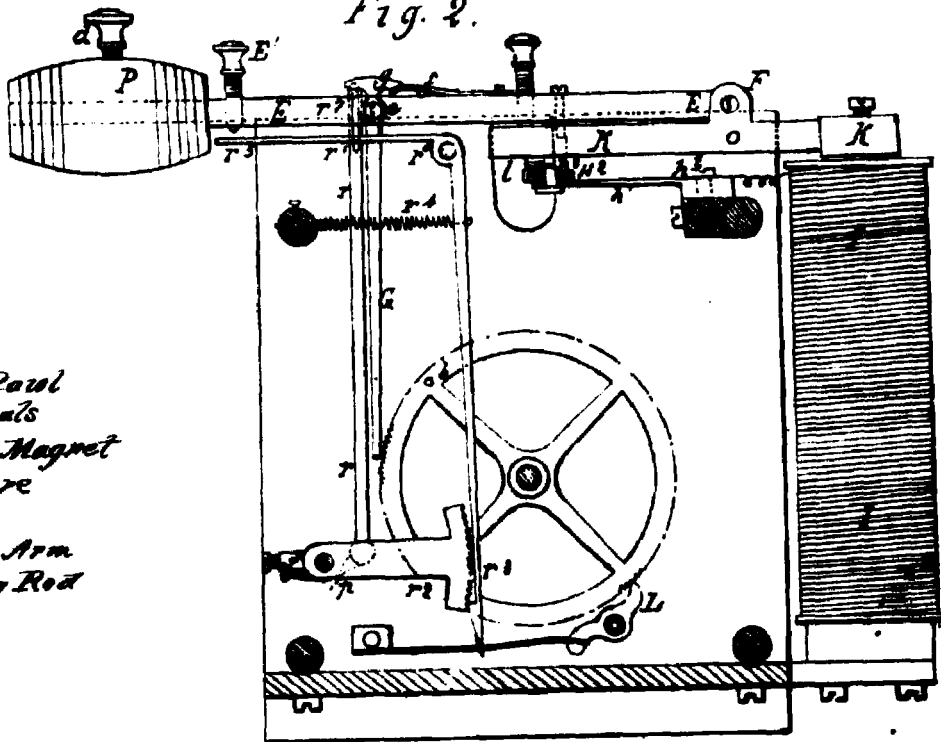
Nikolai Shweizer
Inventor

By A. E. Beach
Attorney

Improvements on Electric Clocks

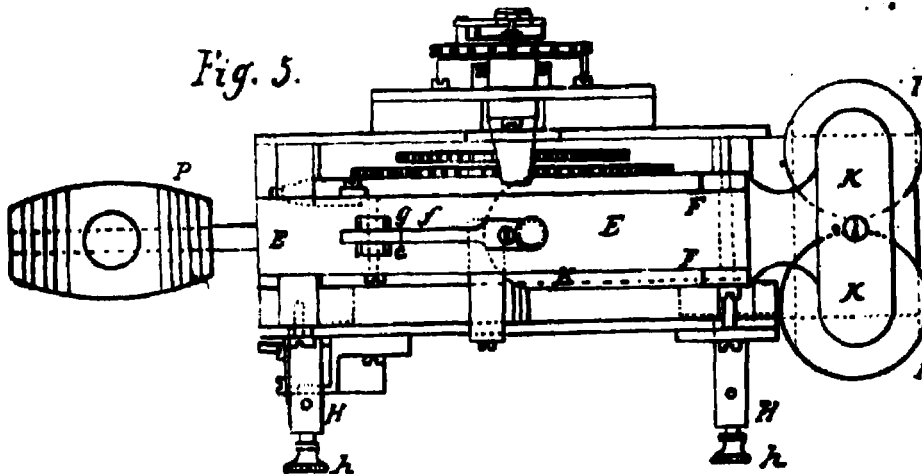
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Fig. 2.



- P-Weight
- E-Lever
- E'-Screw
- F-Pivot
- G-Arm or Pawl
- H-H-Terminals
- I-Electro Magnet
- K-Armature
- i-Pivot
- P-Lever Arm
- r-Connecting Rod
- r2-Rack
- r3-Click
- r6-Arm
- L-Click

Fig. 5.



Certified to be the Drawing referred to
in the Specification herewith annexed

Witnesses:

Edgar Jute

David W. Goldredy

dated New York Sept. 5. 1881.

Joseph Schuigger
Inventor

By

A. C. Deach
Attorney